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*Applications of random characteristics in the context of fragmentation processes*

This talk is concerned with a strong law of large numbers for  $(Z_\eta^\phi)_{\eta \in (0,1]}$ , the so-called *process counted with a random characteristic*  $\phi$ , in the context of fragmentation processes. In this setting random characteristics are stochastic processes that are used to describe certain properties of the block structure of a fragmentation process. For a large class of random characteristics  $\phi$  we prove almost sure convergence and  $L^1$ -convergence of  $Z_\eta^\phi$  as  $\eta \downarrow 0$ .

Motivated by a problem concerning the energy cost arising in the mining industry Bertoin and Martínez proved in [1] the  $L^1$ -convergence for some functional that can be considered as a process counted with a particular characteristic  $\phi$ . In this talk we present a limit theorem for more general random characteristics  $\phi$ . In particular, this enables us to extend the  $L^1$ -convergence result obtained in [1] to almost sure convergence in a more general setting. Moreover, in the spirit of [2] and related laws of large numbers for superdiffusions we also prove the almost sure convergence of random empirical measures associated with the stopping line that corresponds to the first blocks, in their respective “line of descent”, of size less than  $\eta \in (0, 1]$  in a fragmentation process.

References:

[1] J. BERTOIN, S. MARTÍNEZ. Fragmentation energy, *Adv. Appl. Prob.*, **37**, 553–570, 2005

[2] S. C. HARRIS, R. KNOBLOCH, A. E. KYPRIANOU. Strong law of large numbers for fragmentation processes, *Ann. Inst. H. Poincaré Probab. Statist.*, **46** (1), 119–134, 2010